

Claims

[c1] What is claimed is:

1. A method of transferring solder bumps from a mold to a substrate having a plurality of pads comprising the steps of:
providing a base member and a substrate located thereon;
positioning a mold having a plurality of solder elements on said substrate such that each said solder element contacts a corresponding substrate pad and said mold contacts at least one compressible device located on said base member;
causing said mold to compress said compressible device;
heating said solder elements such that each said solder element melts and adheres to said corresponding substrate pad; and
causing said compressible device to decompress and thereby separate said substrate and said mold while the solder elements remain in a molten state thereby causing each said solder element to adhere to said corresponding substrate pad in the form of a solder bump.

[c2] 2. The method according to claim 1 further comprising

the steps of:

allowing said solder bumps to solidify on said substrate pads.

[c3] 3. The method according to claim 1 further comprising the steps of:

positioning a backing plate on said mold; and

applying a force to said backing plate causing said mold to compress the compressible device.

[c4] 4. The method according to claim 3 further comprising the steps of:

placing a thermally ductile buffer on said backing plate; and

applying said force applied to the backing plate through the thermally ductile buffer.

[c5] 5. The method according to claim 4, wherein said step of causing said compressible device to decompress results from applying heat to cause said thermally ductile buffer to change shape resulting in a decrease in the force applied to the backing plate.

[c6] 6. The method according to claim 5, wherein said thermally ductile buffer comprises a solder and changes shape with applied heat.

[c7] 7. The method according to claim 5, wherein said ther-

mally ductile buffer comprises a spring which changes shape with applied heat resulting in a decrease in the force applied to the backing plate.

[c8] 8. The method according to claim 1, wherein said mold contacts a plurality of compressible devices located on said base member.

[c9] 9. The method according to claim 1, wherein said mold has a plurality of cavities each containing said solder element.

[c10] 10. An apparatus for transferring solder bumps from a mold to a substrate having a plurality of pads comprising:
a base member and a substrate located thereon;
a mold having a plurality of solder elements and positioned on said substrate such that each said solder element contacts a corresponding substrate pad and said mold contacts a compressible device located on said base member;
a first device coupled to said mold for enabling the application of a compressive force to said compressible device;
a first reflow heating element for melting said solder elements and causing each said solder element to transfer from said mold to said corresponding substrate pad; and

a second device coupled to said mold for causing said substrate and said mold to separate while said solder elements are melted, resulting in each said solder element adhering to a corresponding pad in the form of a solder bump.

[c11] 11. The apparatus according to claim 10, wherein: said first device coupled to said mold comprises a backing plate.

[c12] 12. The apparatus according to claim 11, wherein: said second device coupled to said mold comprises said reflow heating element to enable a thermally ductile buffer to change shape causing a reduction of force applied to said backing plate and resulting in the decompression of said compressible device and the separation of said substrate and said mold while said solder elements are molten.

[c13] 13. The apparatus according to claim 12, wherein said thermally ductile buffer comprises a solder and changes shape with heat applied from said reflow heating element.

[c14] 14. The apparatus according to claim 12, wherein said thermally ductile buffer comprises a spring which changes shape with heat applied from said reflow heat-

ing element resulting in a reduction of the force applied to said backing plate.

[c15] 15. The apparatus according to claim 10, wherein said mold contacts a plurality of compressible devices located on said base member.

[c16] 16. The apparatus according to claim 10, wherein said mold has a plurality of cavities each containing said solder element.